

**IN THE CLAIMS:**

Please write the claims to read as follows:

1. (Currently Amended) A system for replay of a backup memory in a storage system having a file system for managing transfer of data to and from an attached disk array, the system comprising:
  - 4        a log in the backup memory containing the storage system transaction entries accumulated after a consistency point at which time results of the storage system transaction entries are committed to the disk array;
  - 7        an initiator process that establishes a swarm of messages with respect to the storage system transaction entries and delivers the swarm to the file system; and
  - 9        a parallel disk information-retrieval process in the file system that is carried out
  - 10      on the swarm of messages in parallel.
1. (Original) The system as set forth in claim 1 wherein each of the messages of the swarm is identified by a transaction block including a pointer to one of the transaction request entries in the log, respectively, and a state that indicates whether each of the messages is one of (a) newly transferred to the file system, (b) subject to completion of a LOAD phase thereon by the disk information-retrieval process, (c) subject to completion of a MODIFY phase thereon by a MODIFY process of the file system or (d) incapable of being subject to the LOAD phase until a prerequisite event occurs.
1. (Original) The system as set forth in claim 2 wherein the prerequisite event is completion of the LOAD phase and a MODIFY phase with respect to another of the messages.

- 1    4. (Original) The system as set forth in claim 3 wherein the initiator process is adapted  
2    to retransfer each of the messages incapable of being subject to a load phase until the pre-  
3    requisite event occurs to the file system for completion of the LOAD phase after the pre-  
4    requisite event occurs, respectively.
  
- 1    5. (Original) The system as set forth in claim 4 wherein the initiator is adapted to estab-  
2    lish a skip state with respect to skipped messages for which a portion of the disk array  
3    associated therewith is unavailable, the skip state thereby omitting the skipped messages  
4    from the swarm.
  
- 1    6. (Original) The system as set forth in claim 4 wherein the file system includes a panic  
2    state adapted to alert an operator if a first message received from the initiator in the  
3    swarm is a message incapable of being subject to a load phase until a prerequisite event  
4    occurs.
  
- 1    7. (Original) The system as set forth in claim 4 wherein the file system includes a panic  
2    state adapted to alert an operator if a message retransferred by the initiator process is a  
3    message incapable of being subject to a load phase until a prerequisite event occurs.
  
- 1    8. (Original) The system as set forth in claim 1 wherein the backup memory comprises  
2    a non-volatile random access memory (NVRAM).
  
- 1    9. (Original) The system as set forth in claim 1 wherein the storage system comprises a  
2    network storage appliance.
  
- 1    10. (Currently Amended) A method for replay of a backup memory in a storage system  
2    having a file system for managing transfer of data to and from an attached disk array, the  
3    method comprising:

4        accumulating, in a log in the backup memory, storage system transaction request  
5    entries after a consistency point at which time results of the transaction request entries are  
6    committed to the disk array;  
7        establishing a swarm of messages with respect to the transaction request entries  
8    and delivering the swarm to the file system; and  
9        performing a parallel disk information-retrieval process of the file system on the  
10   swarm of messages in parallel.

- 1    11. (Original) The method as set forth in claim 10 further comprising establishing, for  
2    each of the messages of the swarm, a transaction block including a pointer to one of the  
3    transaction request entries in the log, respectively, and a state that indicates whether each  
4    of the messages is one of (a) newly transferred to the file system, (b) subject to comple-  
5    tion of a LOAD phase thereon by the disk information-retrieval process, (c) subject to  
6    completion of a MODIFY phase thereon by a MODIFY process of the file system or (d)  
7    incapable of being subject to the LOAD phase until a prerequisite event occurs.
- 1    12. (Original) The method as set forth in claim 11 wherein the prerequisite event is com-  
2    pletion of the LOAD phase and a MODIFY phase with respect to another of the mes-  
3    sages.
- 1    13. (Original) The method as set forth in claim 12 further comprising retransferring each  
2    of the messages incapable of being subject to a load phase until the prerequisite event oc-  
3    curs to the file system for completion of the LOAD phase after the prerequisite event oc-  
4    curs, respectively.
- 1    14. (Original) The method as set forth in claim 10 wherein the storage system comprises  
2    a network storage appliance.

1       15. (Currently Amended) A computer-readable medium including program instructions  
2       executing on a computer for parallelized replay of a backup memory in a storage system  
3       having a file system for managing transfer of data to and from an attached disk array, the  
4       program instructions performing the steps of:

5               accumulating, in a log in the backup memory, storage system transaction request  
6       entries after a consistency point at which results of the transaction request entries are  
7       committed to the disk array;

8               establishing a swarm of messages with respect to the transaction request entries  
9       and delivering the swarm to the file system; and

10              performing parallel a disk information-retrieval process of the file system on the  
11       swarm of messages ~~in parallel~~.

1       16. (Original) The computer-readable medium as set forth in claim 15 further comprising  
2       establishing, for each of the messages of the swarm, a transaction block including a  
3       pointer to one of the transaction request entries in the log, respectively, in the log and a  
4       state that indicates whether each of the messages is one of (a) newly transferred to the file  
5       system, (b) subject to completion of the LOAD phase thereon by the disk information-  
6       retrieval process, (c) subject to completion of a MODIFY phase thereon by a MODIFY  
7       process of the file system or (d) incapable of being subject to the LOAD phase until a  
8       prerequisite event occurs.

1       17. (Original) The computer-readable medium as set forth in claim 16 wherein the pre-  
2       requisite event is completion of the LOAD phase and a MODIFY phase with respect to  
3       another of the messages.

1       18. (Original) The computer-readable medium as set forth in claim 17 further comprising  
2       retransferring each of the messages incapable of being subject to a load phase until the  
3       prerequisite event occurs to the file system for completion of the LOAD phase after the  
4       prerequisite event occurs, respectively.

1       19. (Original) The computer-readable medium as set forth in claim 15 wherein the stor-  
2       age system comprises a network storage appliance.

1       20. (Currently Amended) An apparatus for replay of a backup memory in a storage sys-  
2       tem having a file system for managing transfer of data to and from an attached disk array,  
3       comprising:

4                 a processor to determine a consistency point in time, said apparatus containing at  
5       least one transaction entry accumulated after the consistency point, where at the time of  
6       the consistency point the transaction entries are committed to the disk array;

7                 a plurality of messages, each message of said plurality of messages being related  
8       to a transaction entry of said transaction entries accumulated after the consistency point,  
9       said plurality of messages being referred to as a swarm of messages;

10               an initiator process to deliver the swarm of messages to the file system; and

11               a parallel disk information-retrieval process that processes the swarm of messages  
12       in parallel.

1       21. (Previously Presented) The apparatus as set forth in claim 20, further comprising:  
2                 each of the messages of the swarm is identified by a transaction block including a  
3       pointer to one of the transaction request entries.

1       22. (Previously Presented) The apparatus as set forth in claim 20, further comprising:  
2                 a state that indicates whether each of the messages is one of  
3                         (a) newly transferred to the file system,  
4                         (b) subject to completion of a LOAD phase thereon by the disk informa-  
5       tion-retrieval process,  
6                         (c) subject to completion of a MODIFY phase thereon by a MODIFY pro-  
7       cess of the file system, or

(d) incapable of being subject to the LOAD phase until a prerequisite event occurs.

1        23. (Previously Presented) The apparatus as set forth in claim 22, further comprising:  
2                  the prerequisite event is completion of the LOAD phase and a MODIFY phase  
3                  with respect to another of the messages.

1        24. (Previously Presented) The apparatus as set forth in claim 23, further comprising:  
2                  the initiator process is adapted to retransfer each of the messages incapable of be-  
3                  ing subject to a load phase until the prerequisite event occurs to the file system for com-  
4                  pletion of the LOAD phase after the prerequisite event occurs, respectively.

1        25. (Previously Presented) The apparatus as set forth in claim 20, further comprising:  
2              the initiator is adapted to establish a skip state with respect to skipped messages  
3              for which a portion of the disk array associated therewith is unavailable, the skip state  
4              thereby omitting the skipped messages from the swarm.

1    26. (Currently Amended) A method for replay of a backup memory in a storage system  
2    having a file system for managing transfer of data to and from an attached disk array, the  
3    method comprising:

4 accumulating one or more transaction request entries after a consistency point,  
5 said consistency point is a time at which results of the transaction request entries are  
6 committed to the disk array:

7 establishing a plurality of messages with respect to the transaction request entries,  
8 said plurality of messages being referred to as a swarm of messages and delivering the  
9 swarm to the file system; and

10 executing a parallel disk information-retrieval process on the swarm of messages  
11 in parallel.

1       27. (Previously Presented) The method as set forth in claim 26, further comprising:  
2                  establishing, for each of the messages of the swarm, a transaction block including  
3                  a pointer to one of the transaction request entries in the log.

1       28. (Previously Presented) The method as set forth in claim 20, further comprising:  
2                  establishing a state that indicates whether each of the messages is one of  
3                          (a) newly transferred to the file system,  
4                          (b) subject to completion of a LOAD phase thereon by the disk informa-  
5                  tion-retrieval process,  
6                          (c) subject to completion of a MODIFY phase thereon by a MODIFY pro-  
7                  cess of the file system, or  
8                          (d) incapable of being subject to the LOAD phase until a prerequisite  
9                  event occurs.

1       29. (Previously Presented) The method as set forth in claim 28, further comprising:  
2                  using as the prerequisite event completion of the LOAD phase and a MODIFY  
3                  phase with respect to another of the messages.

1       30. (Previously Presented) The method as set forth in claim 29, further comprising:  
2                  retransferring each of the messages incapable of being subject to a load phase un-  
3                  til the prerequisite event occurs to the file system for completion of the LOAD phase af-  
4                  ter the prerequisite event occurs.

1       31. (Currently Amended) An apparatus for replay of a backup memory in a storage sys-  
2       tem having a file system for managing transfer of data to and from an attached disk array,  
3       comprising:  
4                  means for accumulating, a transaction request entry after a consistency point, said  
5                  consistency point is a time at which results of the transaction request entries are commit-  
6                  ted to the disk array;

7       means for establishing a plurality of messages with respect to the transaction re-  
8       quest entries, said plurality of messages being referred to as a swarm of messages and  
9       delivering the swarm to the file system; and

10       means for parallel processing of a disk information-retrieval process of the file  
11       system on the swarm of messages in parallel.

1       32. (Previously Presented) The apparatus as set forth in claim 31, further comprising:  
2           means for establishing, for each of the messages of the swarm, a transaction block  
3           including a pointer to one of the transaction request entries in the log.

1       33. (Previously Presented) The apparatus as set forth in claim 32, further comprising:  
2           means for establishing a state that indicates whether each of the messages is one  
3       of

4           (a) newly transferred to the file system,  
5           (b) subject to completion of a LOAD phase thereon by the disk informa-  
6           tion-retrieval process,  
7           (c) subject to completion of a MODIFY phase thereon by a MODIFY pro-  
8           cess of the file system, or  
9           (d) incapable of being subject to the LOAD phase until a prerequisite  
10          event occurs.

1       34. (Previously Presented) The apparatus as set forth in claim 33, further comprising:  
2           means for using as the prerequisite event completion of the LOAD phase and a  
3       MODIFY phase with respect to another of the messages.

- 1    35. (Previously Presented) The apparatus as set forth in claim 34, further comprising:  
2                means for retransferring each of the messages incapable of being subject to a load  
3                phase until the prerequisite event occurs to the file system for completion of the LOAD  
4                phase after the prerequisite event occurs.
- 1    36. (Previously Presented) A computer readable media, comprising:  
2                said computer readable media having instructions written thereon for execution on  
3                a processor for the practice of the method of claim 10 or claim 26.
- 1    37. (Previously Presented) Electromagnetic signals propagating on a computer network,  
2                comprising:  
3                said electromagnetic signals carrying instructions for execution on a processor for  
4                the practice of the method of claim 10 or 26.
- 1    38. (Previously Presented) The system of claim 1, further comprising:  
2                a third process that modifies at least some messages in the swarm of messages  
3                based on the order in which storage system transaction entries were stored in the log.
- 1    39. (Previously Presented) The method of claim 10, further comprising:  
2                modifying at least some messages in the swarm of messages based on the order in  
3                which storage system transaction request entries were accumulated in the log.
- 1    40. (Previously Presented) The method of claim 26, further comprising:  
2                modifying at least some messages in the swarm of messages based on the order in  
3                which transaction request entries were accumulated in the log.
- 1    41. (Currently Amended) A file system, comprising:  
2                a backup memory storing a plurality of file system transaction entries;

3        a first process that establishes a swarm of messages with respect to the file system  
4 transaction entries and delivers the swarm of messages to the file system;  
5        a second process that performs a parallel LOAD phase ~~in-a-concurrent manner~~ for  
6 a plurality of messages in the swarm of messages; and  
7        a third process that performs a MODIFY phase for at least some messages in the  
8 swarm of messages, the MODIFY phase operating on messages based on the order in  
9 which file system transaction entries were stored in the backup memory.

1 42. (Previously Presented) The file system of claim 41, further comprising:  
2        a fourth process that determines whether a file system transaction entry corre-  
3 sponds to a file system transaction that can be performed right away.

1 43. (Previously Presented) The file system of claim 42, wherein the fourth process,  
2 in response to determining that the file system transaction can not be performed right  
3 away, associates the file system transaction entry with a LOAD RETRY state until a prior  
4 prerequisite transaction is performed.

1 44. (Currently Amended) A method, comprising:  
2        storing a plurality of file system transaction entries in a backup memory;  
3        establishing a swarm of messages with respect to the file system transac-  
4 tion entries;  
5        delivering the swarm of messages to a file system;  
6        performing a parallel LOAD phase ~~in-a-concurrent manner~~ for a plurality  
7 of messages in the swarm of messages; and  
8        performing a MODIFY phase for at least some messages in the swarm of  
9 messages, the MODIFY phase operating on messages based on the order in which  
10 file system transaction entries were stored in the backup memory.

1 45. (Currently Amended) A system, comprising:

2           means for storing a plurality of file system transaction entries in a backup  
3           memory;  
4           means for establishing a swarm of messages with respect to the file system  
5           transaction entries;  
6           means for delivering the swarm of messages to a file system;  
7           means for performing a parallel LOAD phase ~~in-a concurrent manner~~ for a  
8           plurality of messages in the swarm of messages; and  
9           means for performing a MODIFY phase for at least some messages in the  
10          swarm of messages, the MODIFY phase operating on messages based on the or-  
11          der in which file system transaction entries were stored in the backup memory.

1 Please add new claims 46 *et al.*

1 46. (New) A method, comprising:

2       storing a plurality of file system transaction entries in a backup memory;  
3       establishing a swarm of messages with respect to the file system transaction en-  
4 tries;  
5       delivering the swarm of messages to a file system; and  
6       performing a parallel retrieval process for a plurality of messages in the swarm of  
7 messages by processing the messages in a somewhat arbitrary order, where the retrieval  
8 process is processed by commingling the processing of messages and steps of the re-  
9 trieval process.